

should be handed over to the surgeon as soon as diagnosed.

Dr. Ross (Toronto) read the first paper on the surgical treatment. He believed in opening, washing out with saline, removing the intestines and cleaning them if necessary, replacing and sewing up without drainage, and then giving lots of opium. He did not see any difference in the absorptive power of any one part of the peritoneum over another, and did not use Fowler's position; and as for salines by rectum or otherwise, he was not sure whether they did any good or not. Drainage was useless, as the tubes were surrounded by lymph, and isolated from the abdominal cavity in the first twenty-four hours. In cases of this kind he had 20 per cent. recoveries, with rather better results in the last five cases, to which he had added eight done by his assistant with but one death.

Dr. McLAREN (St. John) followed by stating that he opened, removed any focus, left the intestines severely alone, did not wash out but drained, used the Fowler position and rectal salines given by Murphy's method, and he never used opium unless he was absolutely compelled to.

Dr. PREVOST (Ottawa) never treated two cases exactly alike, but believed in operating on all cases where good might be done, and removing the point of origin of trouble if possible, and draining.

The discussion which followed was commenced by Dr. BRUCE (Toronto). He could not accept Dr. Ross's method, but followed that of Dr. Murphy (Chicago) as outlined by Dr. McLaren. He himself had had a mortality of but little over 5 per cent. by using this method, and he felt confident that in a very short time this result would be expected on every side. Dr. Murphy expected that the recoveries would be 98 per cent., and at the present time he had just reported 33 cases with but one death. This remarkable record he considered the best evidence in its favour. He believed in the Fowler position and in drainage, and also in withholding opium, as well as the Murphy plan of rectal salines. He believed that the outlook in general peritonitis was improving rapidly, but did not think it wise to operate on moribund patients.

Dr. ARCHIBALD (Montreal) advocated opening the abdomen, removing any centre or focus, and evacuating free pus, then sewing up the abdomen without drainage; a modified Fowler's position was assumed—a sufficient elevation of the body to cause a general tendency for the fluids to reach the pelvis, together with rectal saline. His reason for stopping drainage was that it was useless. In 100 experiments which he had conducted upon animals he had been astounded at the rapidity with which a drainage tube was cut off from the general peritoneum, a few hours being sufficient to convert what one might expect to be first-class drainage into a blind sinus. This only corroborated what he had observed as a house-surgeon when he had to empty drainage tubes every two hours night and day; all that he ever removed was a little bloody serous fluid for twenty-four hours, and then after a few days pus was secreted by the sinus walls. As far as results went, he had a very modest show to make, after the former speaker; he could show only 25 per cent. recoveries. These were from general septic peritonitis, however, in which the pelvis and both flanks were involved, the condition being present at least as high as the umbilicus. The results in the Royal Victoria Hospital, Montreal, had never shown less than 40 per cent. mortality, and in one year no recoveries were recorded. He had improved upon the average results very much since adopting this treatment. He was afraid that he was going to be a little rash, but he was going to question the statistics just quoted. It was acknowledged that Murphy of Chicago picked his cases of general peritonitis, and would not operate upon any case of more than forty hours' duration. That any bad cases that happened to come into his practice were handed over to another operator if operable. Further, that many men considered a case moribund that was merely a bad case of general peritonitis, such as his own statistics were based upon, and refused to operate upon them, thus again disturbing statistics. He personally gave every case the benefit of the doubt, and operated whenever justified. Again, he did not see how a man could open the abdomen through one small incision, remove, say, the appendix, and call the case one of general peritonitis. Many cases of diffuse limited peritonitis would thus be classed as general

peritonitis, a class of case which of course one would hardly dream of losing. He thought that something was radically wrong with the statistics, when but 2 or even 5 per cent. mortality was obtained in general peritonitis.

The point made by Dr. Archibald was discussed later by various members of the profession, and it appears that there is a very bad condition of affairs not only in Chicago but in several other places, particularly in the west of the United States. A man gets a small unbroken series of successful operations, and the lust of statistics enters his mind, and he plans to keep his record clear. In the case of peritonitis, for example, he will not operate after forty hours, and has his house-physician or admitting officer closely question all cases before admission, and wave away by telephone all cases that might have an unfortunate termination. Thus the chief really never comes into contact with them, and is entirely innocent (?) except when a really bad case does slip in; then he either calls it moribund and refuses to operate, or hands it over to a more honest if less celebrated colleague. Some statistics were quoted in the afternoon in which there was something like 97 per cent. of recoveries. Investigation showed that the operator, who was not present, never claimed that these were general peritonitis, but only diffuse localized conditions.

LONDON WATER SUPPLY.

REPORT OF DIRECTOR OF WATER EXAMINATIONS.

At a meeting of the Metropolitan Water Board held on July 17th a report by the Director of Water Examinations, Dr. A. C. Houston, of the work carried out at the Board's laboratory during the twelve months ended March 31st, 1908, was presented. The information contained in the report was considered so important that the Water Examination Committee was of opinion that it should be permanently recorded in the minutes of the Board so as to be available for public information, as a means, *inter alia*, of ready reference to the chemical and bacteriological qualities of the water supplied from the Board's several works. The report is a very elaborate one, and gives in detail the results of the chemical and bacteriological examination of the London waters for the twelve months under review. Only Dr. Houston's conclusions can be given here.

CONCLUSIONS.

He recapitulates the following conclusions stated in his last year's report:

1. The unsatisfactory quality of the raw waters, particularly during the winter months.
2. The importance of judicious selection of raw water for waterworks purposes.
3. The doubt whether the raw waters, even during the best months of the year, are sufficiently free from impurities to be filtered without antecedent storage.
4. The importance of possessing as full knowledge as possible of the multiple pollutions of the rivers Thames and Lee.

Storage.

5. The unequal, and in some cases inadequate, duration of storage in connexion with the Board's different works.
6. The difference between "active and passive storage," and the great importance of active storage from the epidemiological point of view.

Filtration.

7. The unequal, and in some cases too rapid, rate of filtration at the different works.

Service Reservoirs.

8. The small size of the service reservoirs, leading in some cases to variable rates of filtration during the twenty-four hours.

Filtered Water.

9. The variable and in some cases not altogether satisfactory quality of the water as delivered to the consumers from the different works, and the general deterioration in the results during the winter months of the year.
10. The remarkable percentage improvement in the quality of the raw water effected by the processes of storage and filtration.
11. The satisfactory quality, generally speaking, of the metropolitan water supply, as judged by average results and more particularly by the results obtained during the summer months of the year.
12. The importance of bringing the worst results more closely into agreement with the best results by endeavouring to reduce the manifold pollutions of the rivers Thames and Lee by judicious selection of raw water for waterworks purpose, by the active utilization of storage reservoirs, and by proved slow filtration at a uniform rate, through sand of sufficient fineness and depth.

Dr. Houston's conclusions for the present year remain the same, but the following additions are made:

13. Eighteen experiments have been carried out on the longevity of the typhoid bacillus in samples of raw Thames, Lee and New River water, and the results showed that in practically all the experiments over 99 per cent. of the typhoid bacilli artificially added to the experimental water died within one week. Nevertheless, in the majority of the experiments a very few of the typhoid bacilli remained alive for one or two months. The obvious conclusion is that, whilst it may be difficult to store raw water for such a length of time that, even if the river water did initially contain typhoid bacilli, their death would be absolutely certain to take place, there is no difficulty in storing it sufficiently long to reduce enormously any element of danger likely to arise from this cause; hence the extreme undesirability of ever using unstored raw river water for filtration purposes.

14. The results of the examination of river water antecedent and subsequent to storage, carried out during the last eight months, clearly prove that, apart from the question of algae growths, the advantages to be gained by adequate storage are of a general and material kind, and are not limited merely to the elimination of pathogenic bacteria.

15. It is now possible to judge by comparatively simple tests and with reasonable accuracy, whether raw river water has been stored for a length of time sufficing to ensure destruction of all (or nearly all) typhoid bacilli (and inferentially also of other microbes causing waterborne disease) if these happened to be present originally in the water. This distinctive and valuable knowledge is arrived at by correlating the results of tests dealing with the longevity of the typhoid bacillus in raw river water, with those showing the length of time that raw river water must be stored before it exhibits certain changes in its original composition. Hence a new factor has arisen in the work of examining the London waters, which is believed to be of primary importance. Briefly, dependence is now being placed more and more on experimental proof that the water reaching the filter beds, as the result of adequate storage, is in a reasonably "safe" condition antecedent to filtration.

16. Certain investigations carried out since last year tend to make one look with rather less disfavour than previously on the present sources of water supply.

In the first place, the extreme difficulty experienced in isolating faecal streptococci from 1 c.cm. of the raw waters is a point in their favour. Secondly, the fact that no typhoid bacilli have been found in the raw waters, despite the use, for nearly a year, of the most recent and searching tests for this microbe, is a matter worth noting. Negative evidence, however, in experiments of this kind, is apt to be unconvincing; still it can be said with confidence that the nature of the negative evidence which has been accumulated is of a much less inconclusive character than any previously brought forward.

These remarks, however, must not be read as implying that any relaxation in the existing processes of purification of the river water by means of storage and filtration is justifiable.

17. Lastly, it needs to be remembered that it is not only necessary to reduce the pollutions of the rivers Thames and Lee and to store, as well as to filter, the raw water in a satisfactory manner. It is also necessary to guard against the possibility of accident. In this connexion questions of drainage, health of workmen, suction of impure water into water mains, laying of new mains, alterations to existing mains, condition of service reservoirs, etc., deserve attention.

RESEARCH WORK.

The first report of the Director of Water Examinations on research work was also presented to the Water Examination Committee. It deals with the vitality of the typhoid bacillus in artificially infected samples of raw Thames, Lee, and New River water, with special reference to the question of storage. The report is of a reassuring character, for it indicates clearly that when samples of river water are stored in the laboratory after being artificially infected with millions of typhoid bacilli, the vast majority of these bacilli die within one week. In all the experiments a few of the typhoid bacilli persisted for several weeks, but, looking at the results from a practical point of view, the results seem to show that storage of river water for four weeks affords ample security against danger. Dr. Houston points out that on scientific grounds it is essential to note that demand might arise for storage of water for two months, because in two of eighteen experiments made a few typhoid bacilli were alive eight weeks after infection of the water. Nevertheless, he is of opinion that no serious exception should be taken to a proposition that for all practical purposes the limit may reasonably be placed at eight weeks. Dr. Houston endeavours to crystallize the chief conclusions at which he is arriving in the following paragraphs:

(a) It is most desirable that the question of storage should be looked at from a general standpoint, so as to render the length of time during which water is stored more uniform throughout the different districts; hence the policy of intercommunication

already being applied to the filtered water should be extended to the stored water, as far as this is practicable.

(b) The advantages accruing from even a few days' storage may be so material that, exceptional cases apart, the use of raw unstored river water for filtration purposes should strongly be deprecated.

(c) Although as a counsel of perfection a water should possibly be stored for one to two months, storage for four weeks may perhaps, in the present state of our knowledge, be regarded as affording a sufficient margin of safety.

(d) It is possible to determine, with reasonable accuracy, whether the water being used for filtration purposes has been stored antecedently for such a length of time as to give relative (if not absolute) assurance that any harmful properties it may originally have possessed have been destroyed in the process of storage.

(e) It is not impossible that the additional "safety" conferred by adequate storage may come to be regarded as a reasonable pretext for filtration through mechanical filters, at specially rapid rates, thereby effecting considerable economies in the cost of filtration as ordinarily practised, but any departure from old-established filtration custom should not be entertained in the absence of convincing experimental proof of the reliability of the new process.

(f) The question of storage is one both of quality and quantity; and, strictly speaking, the number of days it is desirable to store water to improve its quality should be added to the minimum number of days of storage which it is necessary to provide in guarding against the possibility of a shortage of water; nevertheless, during a considerable part of each year, there is an abundance of water of relatively good quality in the Thames and Lee, and the existing storage reservoirs are sufficiently large, in the aggregate, to improve enormously the water derived from these rivers.

(g) How far it is possible to unify the existing system of storage and to effect radical alterations in the present regulations governing the abstraction of water from the rivers in question are matters which may seem to lie outside the province of this report, but they have so large an influence on the provision of a uniformly safe and wholesome water supply for London, at a reasonable cost, that it is necessary to mention them.

(h) The advantages accruing from adequate storage of water are of a general character, and are not limited to the elimination of danger from typhoid fever.

With regard to these conclusions, the Water Examination Committee points out in its report that the points specially dealt with are (1) the desirability of unifying the existing system of storage; (2) the remarkable improvement in river water resulting from storage, and the assurance that, practically speaking, all adequately stored water is incapable of causing epidemic disease. The Committee goes on to say that the report raises the question whether the storage desirable for purposes of safety is to be in excess of that required to guard against the contingencies of flood and drought. The Director, it is pointed out, evidently considers that, strictly speaking, the number of days it is desirable to store the water to improve its quality should be added to the number of days' storage necessary to guard against prolonged floods and exceptional drought. In other words, that under no set of circumstances should a water be used for infiltration purposes which has been stored for a less period than the minimum number of days to be agreed upon as necessary for purposes of safety. It is evident, however, that the Director brings forward this view rather as a scientific counsel of perfection, and he foresees that it may be found necessary to base storage calculations on the cubic capacity of the storage reservoirs necessary to hold the number of days' supply which may ultimately be agreed upon as the minimum. In this view of the case all river water would be stored for that number of days under normal conditions, and for a shorter period under exceptional circumstances. In regard to what the Director terms the "safety change" in river water occurring as the result of storage, the Committee says it is evident that a new line of defence of the safety of the metropolitan water supply is foreshadowed here, which may be of great administrative importance. The Committee recommended:

That the first report by the Director of Water Examinations on the subject of research work regarding the vitality of the typhoid bacillus in artificially infected samples of raw Thames, Lee, and New River water, with special reference to the question of storage, be circulated to scientific bodies, and that copies be placed on sale at the Central Office of the Board.

THE Great Eastern Railway Company has issued a small handbook, profusely illustrated, giving information with regard to the watering places on the east coast of England, including Felixstowe, Lowestoft, Cromer, and many others.